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SPECIFICATION FOR FLAKE RESINS FOR USE IN SHELL PROCESS IN FOUNDRIES

UDC 678·632′32′21-493·5:621·744·56

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 2

November 1985

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SPECIFICATION FOR FLAKE RESINS FOR USE IN SHELL PROCESS IN FOUNDRIES

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Indian Standard

SPECIFICATION FOR FLAKE RESINS FOR USE IN SHELL PROCESS IN FOUNDRIES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 March 1985, after the draft finalized by the Foundry Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 In recent years, solid resins in the form of flakes in combination with catalyst and lubricant for use in the production of shell cores or moulds, using hot sand coating process in foundries has gained increased importance. It is, therefore, felt that this standard will give assistance to the foundries to enable them to check the quality of flake resin, its catalyst and lubricant.

0.3 This standard contains **3.1, 8.1, 8.2** and **9.1** which call for agreement between the purchaser and the manufacturer.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS:2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the requirements for flake resin, catalyst and lubricant in combination, for use in production of shell cores or moulds in a foundry using hot sand coating process.

2. SUPPLY OF MATERIAL

2.1 General requirements relating to supply of flake resin and its catalyst shall be as laid down in IS : 1387-1967†.

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*Rules for rounding off numerical values (*revised*).

†General requirements for the supply of metallurgical materials (*first revision*).

3. MANUFACTURE

3.1 The resin shall be synthetic in nature produced by catalytic reaction of phenol and formaldehyde. The resin shall be supplied in the form of flakes. The catalyst shall be manufactured by pulverizing hexamine powder. Lubricant which consists of wax and additive may be added separately into the sand mix during the coating operation. The exact process of manufacture and formulations of the product shall be decided by the manufacturers.

4. SAMPLING

4.1 Sampling and testing shall be carried out according to manufacturer's production batches. A suitable sized sample shall be taken out from all the drums of a particular batch, mixed and used for testing.

5. DESCRIPTION

5.1 Phenol formaldehyde resin, flake type (novalac resin) suitable for hot coating of sand.

6. GRADES

6.1 There shall be two grades of flake resins depending on their melting point, namely, Grade I and Grade II.

7. REQUIREMENTS

7.1 The requirements of flake resins shall be as given below:

Sl No.	*Characteristics*	*Requirements*	
		Grade I	Grade II
1.	*Melting point* °C	75-80	70-75
2.	*Flow property*—flow in mm	80-120	80-120
3.	*Flake size*		
	a) Length in mm	10-15	10-15
	b) Width in mm	5-10	5-10
	c) Thickness in mm	1-2	1-2
4.	*Coated sand properties* (flake resin 3·5 percent of sand and catalyst 15 percent of flake resin).		
	a) Cold tensile, kg/cm^2	20 *Min*	20-22
	b) Stick point in °C	102-110	93-102
	c) Gas content, cc/g	27-29	27-29

8. SAND MIXTURE AND MIXING PROCEDURE FOR TESTING

8.1 Sand Mixture — Sand mixture shall be of the following proportion:

Standard silica sand conforming to IS:3018-1977* (500 μm)	100 parts
Flake resin	3·5 percent (based on weight of sand)
Catalyst	12-18 percent (based on weight of resin)
Water	0·5-1·5 percent (based on weight of sand)
Lubricant	4-5 percent (based on weight of resin)

8.2 Mixing Procedure

a) Charge sand into mixer at 140°—180°C (depending upon the ultimate properties required in the sand).

b) Add flake resin and lubricant.

c) Depending upon the weather conditions and the size of the batch the mixing time may vary from 50—160 seconds.

d) Add solution of catalyst and water.

e) Turn on exhaust air and mix or mull until lumps are broken to the size of table tennis balls.

f) Discharge sand—screen and aerate.

g) Cool to 55°C.

9. TESTING METHOD

9.1 Testing requirements of resin and coated sand properties shall be as agreed to between the purchaser and the manufacturer.

9.2 The gas content shall be determined as specified in IS : 1918-1966†.

9.3 Melting point of the flake resin shall be determined by the capillary method as given in Appendix A.

10. PACKING

10.1 The resin and the catalyst shall be supplied in polythene lined gunny bags or steel drums as may be agreed by the purchaser and the supplier.

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*Standard silica sand for raw material testing in foundries.

†Methods of physical tests for foundry sands.

11. SHELF-LIFE

11.1 When stored as recommended by the supplier, the material shall not fail to meet the requirements given in **7.1**, within stipulated shelf-life period.

12. MARKING

12.1 Each drum or bag shall carry the manufacturer's name, brand name of the product, date of the manufacture and expiry date, and production batch number.

12.1.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(*Clause* 9.3)

CAPILLARY TEST METHOD FOR THE DETERMINATION OF MELTING POINT OF FLAKE RESIN

A-1. APPARATUS

A-1.1 The apparatus consist of capillary tube holder having a magnifying glass *in the front and a bulb in the rear, a provision for fixing the thermometer* and a controlled (1°C/min) heating device (electrical filaments).

A-2. TEST METHOD

A-2.1 The sample is filled in the capillary tube and placed on the holder. The tube is heated slowly till the sample melts and becomes transparent. Heating is discontinued at this point and the melting point is noted. This experiment is repeated three times and the mean of these values shall be reported as the melting point of the flake resin.